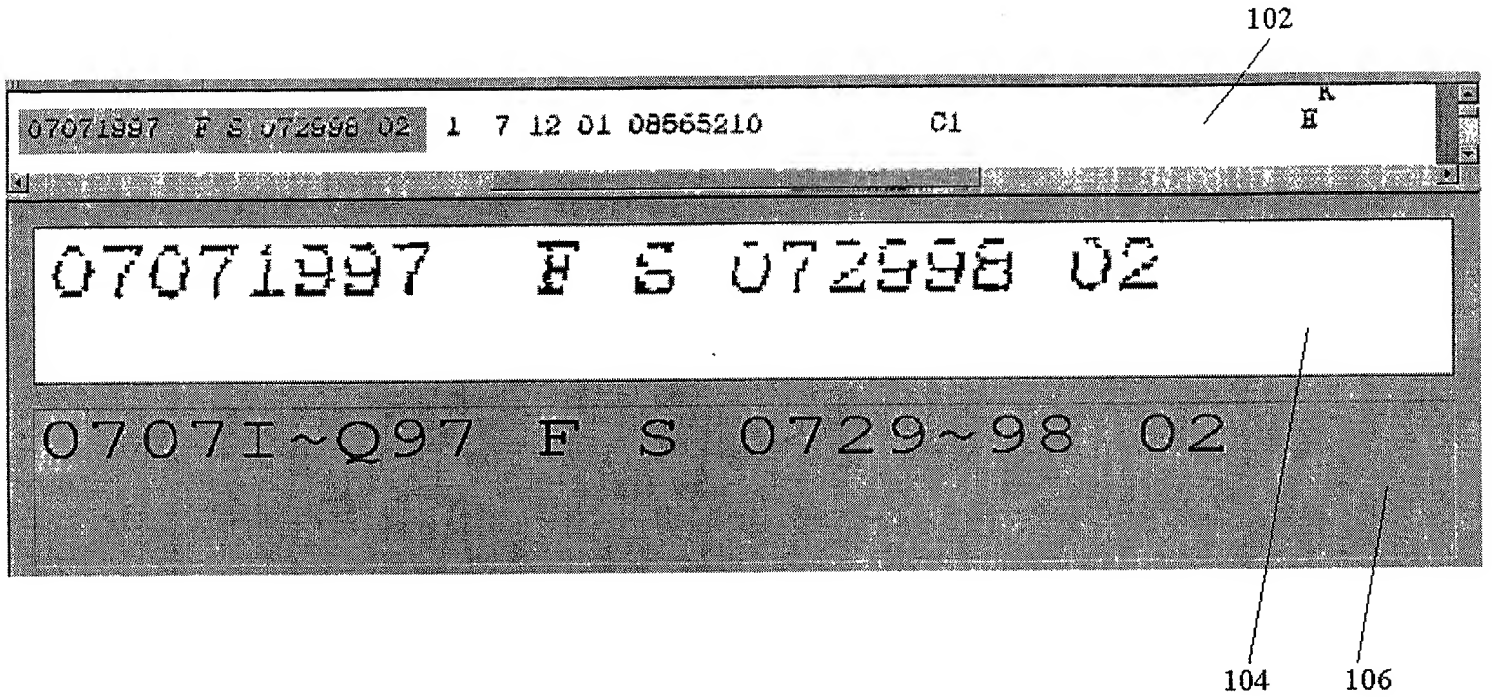

102
07071997 F S 072998 02 1 7 12 01 08565210 C1
07071997 F S 072998 02
07071997 F S 0729~98 02
104
106

Figure 1

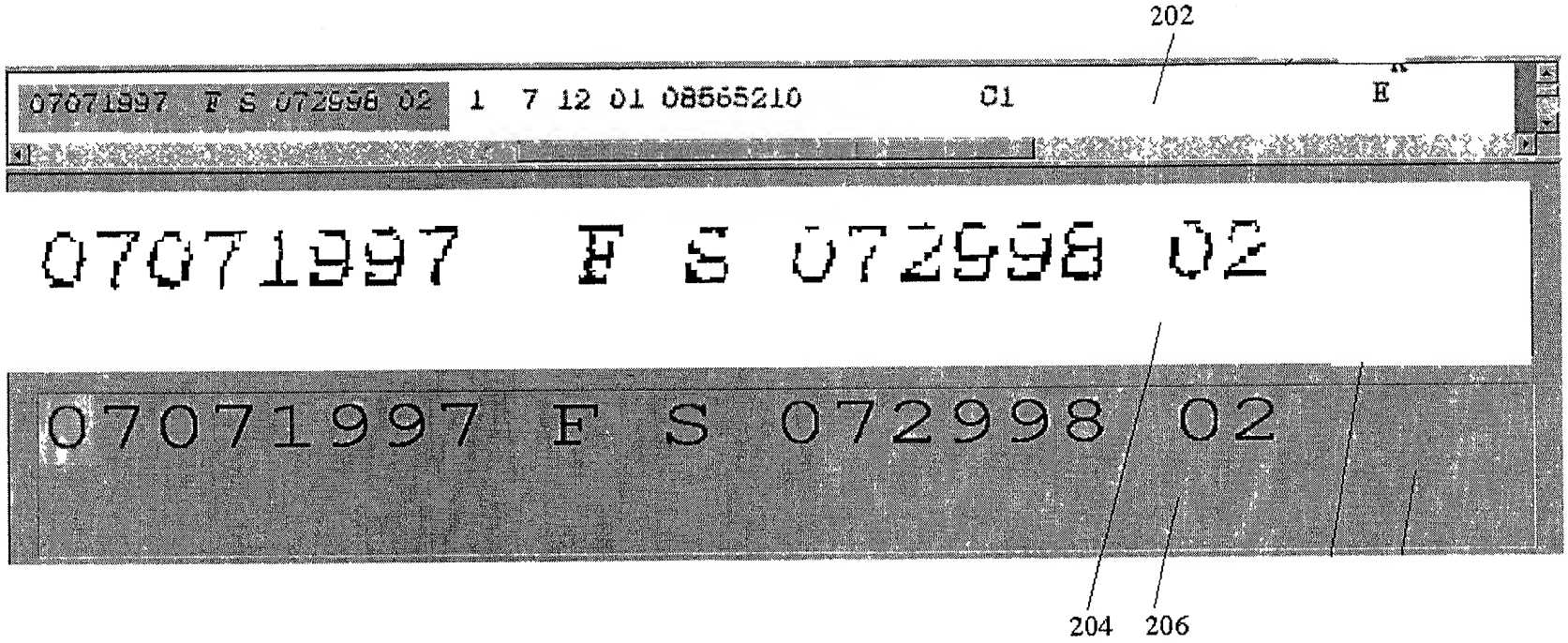

202
07071997 F S 072998 02 1 7 12 01 08565210 01 E
07071997 F S 072998 02
07071997 F S 072998 02
204
206

Figure 2

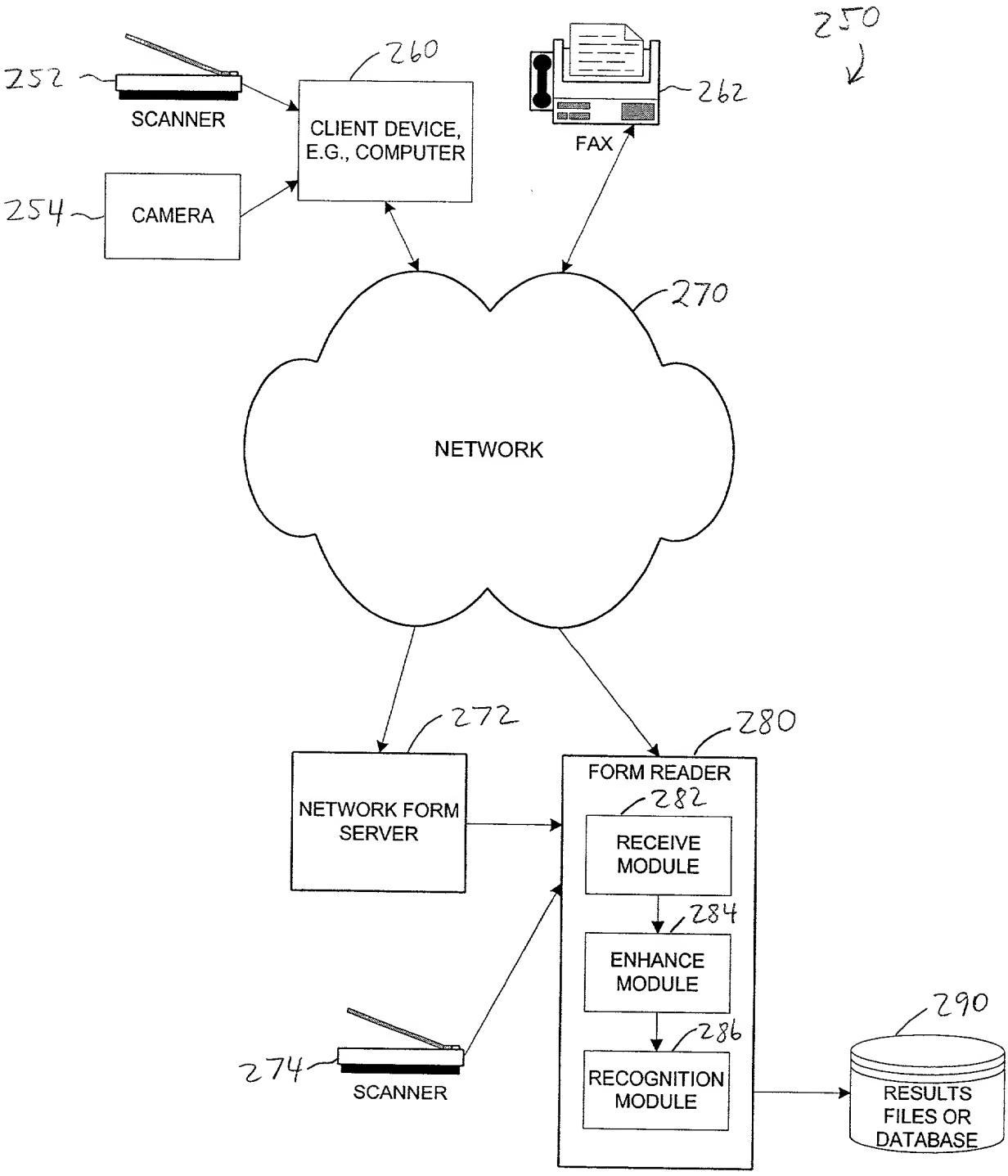

250
252
SCANNER
260
CLIENT DEVICE, E.G., COMPUTER
262
FAX
254
CAMERA
270
NETWORK
272
NETWORK FORM SERVER
280
FORM READER
282
RECEIVE MODULE
284
ENHANCE MODULE
286
RECOGNITION MODULE
290
RESULTS FILES OR DATABASE
274
SCANNER

FIG. 3a

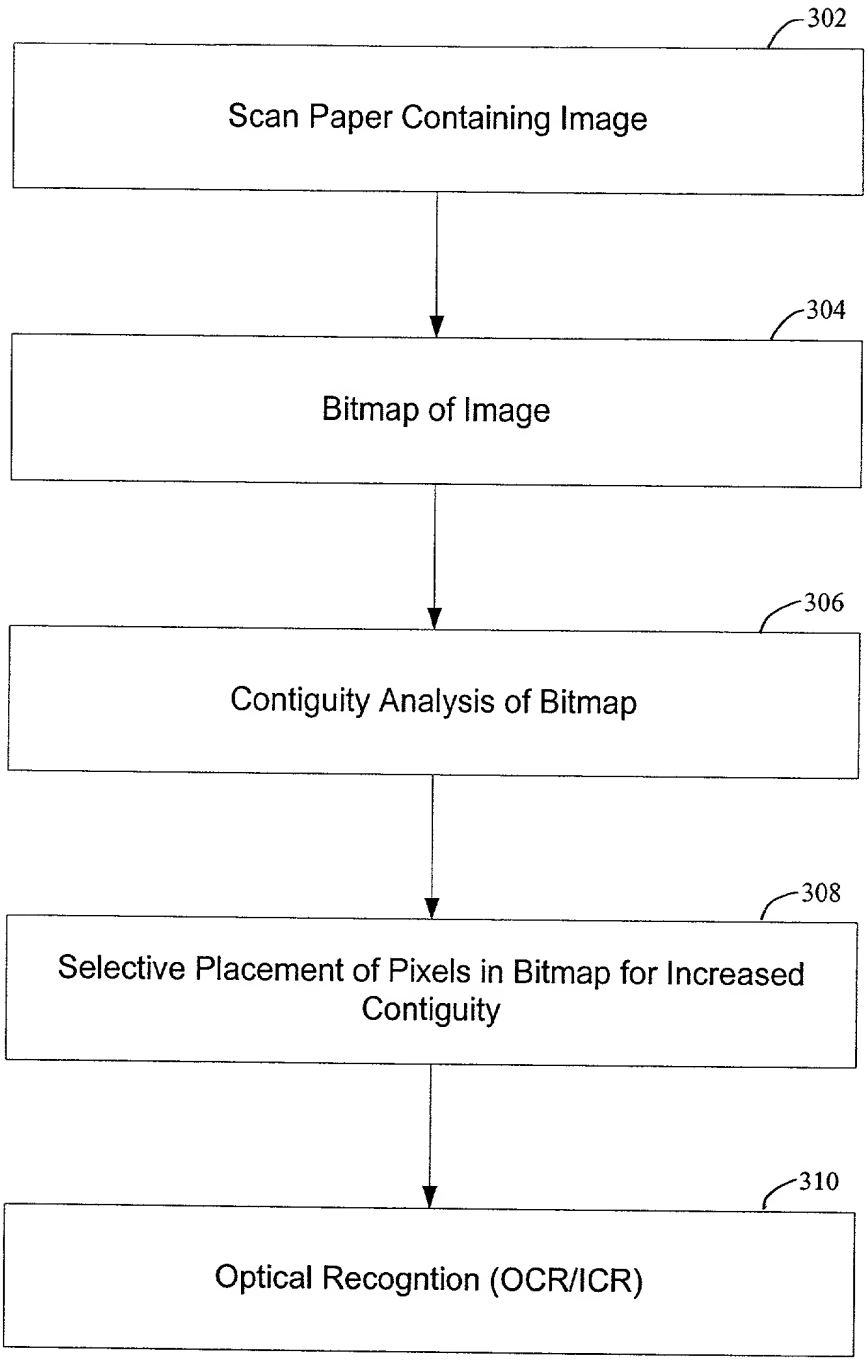

302
Scan Paper Containing Image
304
Bitmap of Image
306
Contiguity Analysis of Bitmap
308
Selective Placement of Pixels in Bitmap for Increased Contiguity
310
Optical Recogntion (OCR/ICR)

Figure 3b

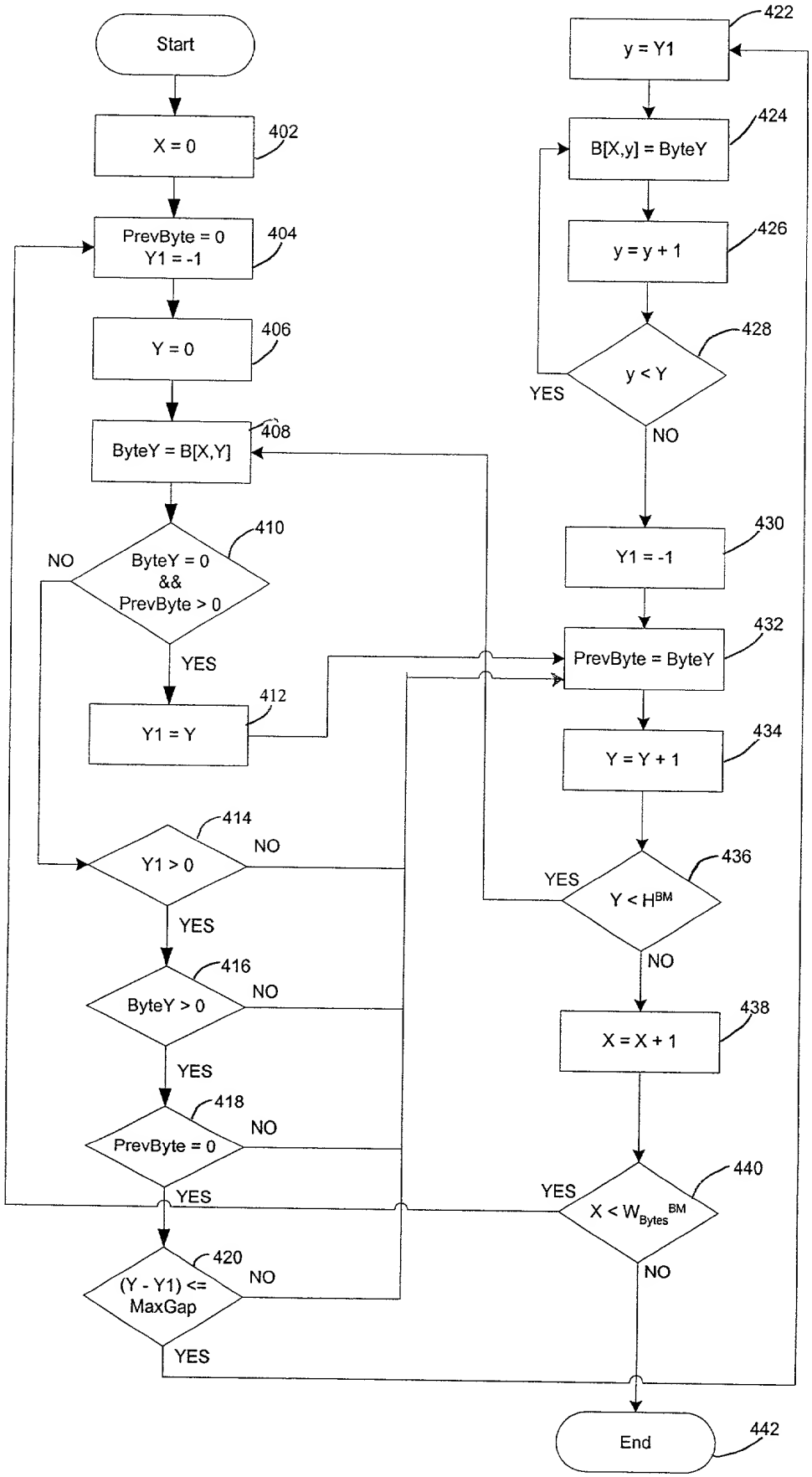

Start
X = 0
402
PrevByte = 0
Y1 = -1
404
Y = 0
406
ByteY = B[X,Y]
408
ByteY = 0
&&
PrevByte > 0
410
NO
YES
Y1 = Y
412
Y1 > 0
414
NO
YES
ByteY > 0
416
NO
YES
PrevByte = 0
418
NO
YES
(Y - Y1) <=
MaxGap
420
NO
YES
y = Y1
422
B[X,y] = ByteY
424
y = y + 1
426
y < Y
428
YES
NO
Y1 = -1
430
PrevByte = ByteY
432
Y = Y + 1
434
YES
Y < H^BM
436
NO
X = X + 1
438
YES
X < W_Bytes^BM
440
NO
End
442

Figure 4

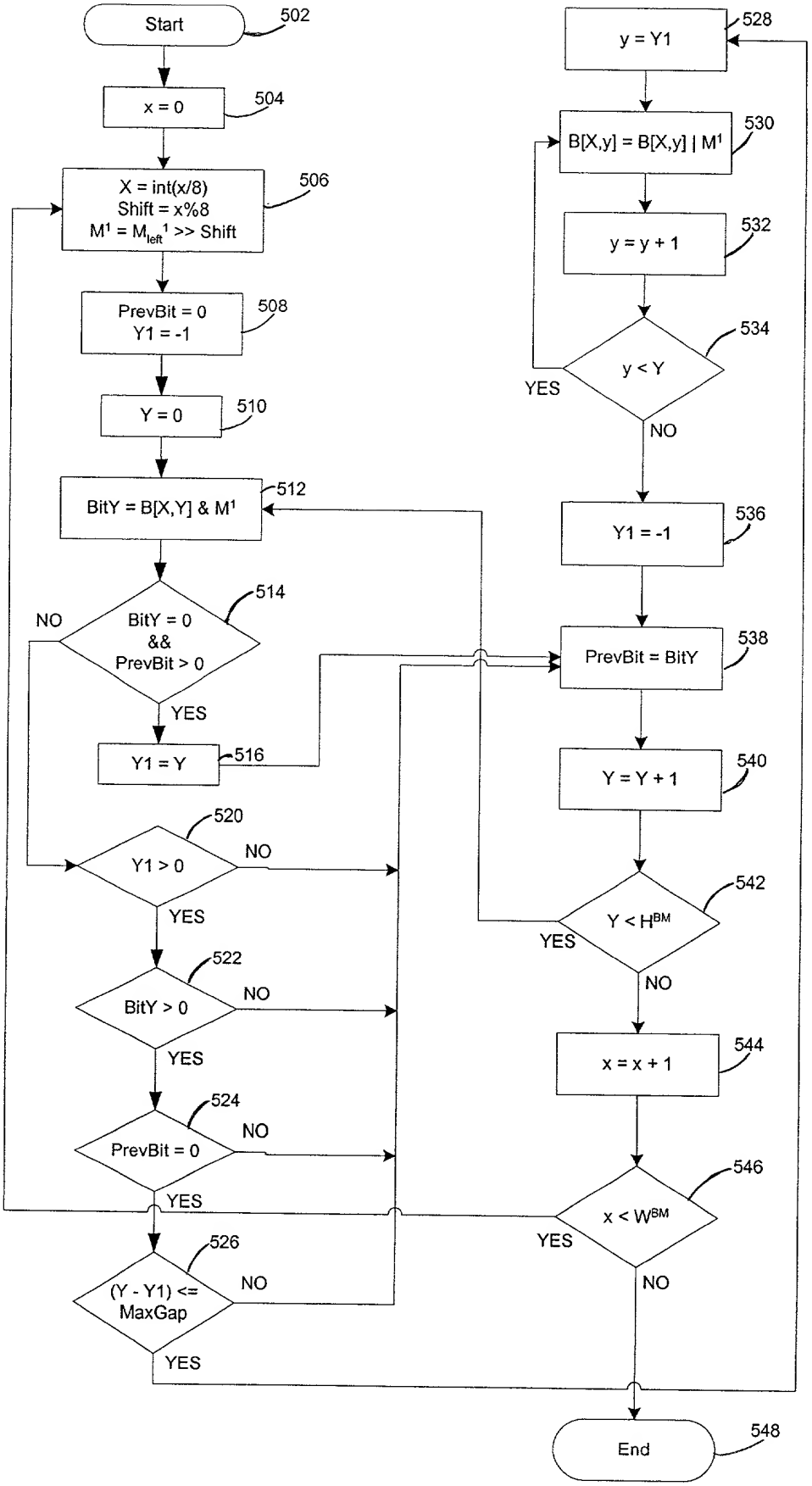

Start
502
x = 0
504
X = int(x/8)
Shift = x%8
M1 = Mleft1 >> Shift
506
PrevBit = 0
Y1 = -1
508
Y = 0
510
BitY = B[X,Y] & M1
512
BitY = 0
&&
PrevBit > 0
514
NO
YES
Y1 = Y
516
Y1 > 0
520
NO
YES
BitY > 0
522
NO
YES
PrevBit = 0
524
NO
YES
(Y - Y1) <=
MaxGap
526
NO
YES
y = Y1
528
B[X,y] = B[X,y] | M1
530
y = y + 1
532
y < Y
534
YES
NO
Y1 = -1
536
PrevBit = BitY
538
Y = Y + 1
540
Y < HBM
542
YES
NO
x = x + 1
544
x < WBM
546
YES
NO
End
548

Figure 5

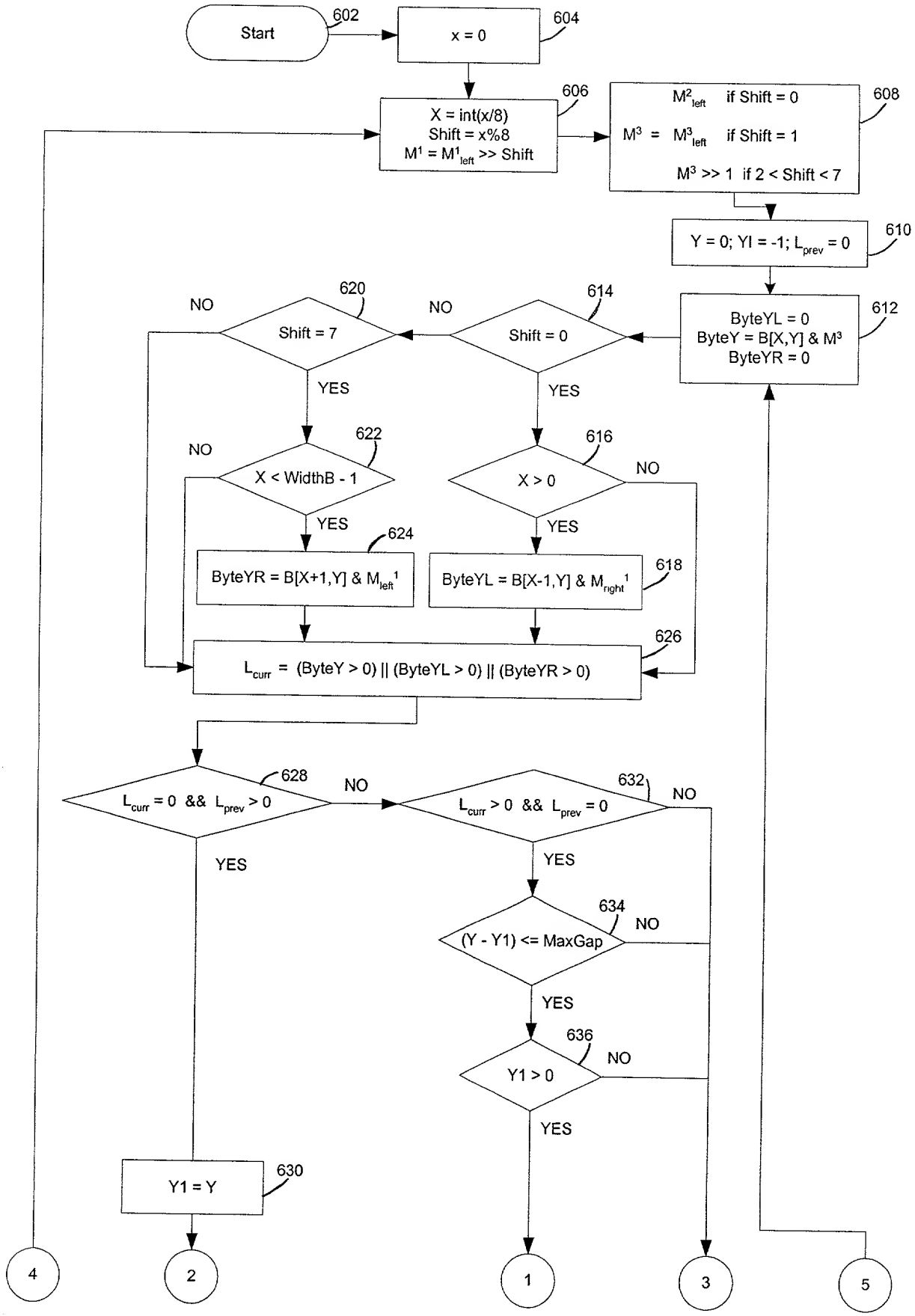

Start
602
x = 0
604
X = int(x/8)
Shift = x%8
M1 = M1left >> Shift
606
M2left if Shift = 0
M3 = M3left if Shift = 1
M3 >> 1 if 2 < Shift < 7
608
Y = 0; YI = -1; Lprev = 0
610
ByteYL = 0
ByteY = B[X,Y] & M3
ByteYR = 0
612
Shift = 0
614
NO
YES
Shift = 7
620
X > 0
616
X < WidthB - 1
622
ByteYL = B[X-1,Y] & Mright1
618
ByteYR = B[X+1,Y] & Mleft1
624
Lcurr = (ByteY > 0) || (ByteYL > 0) || (ByteYR > 0)
626
Lcurr = 0 && Lprev > 0
628
Lcurr > 0 && Lprev = 0
632
(Y - Y1) <= MaxGap
634
Y1 > 0
636
Y1 = Y
630
4
2
1
3
5

Figure 6a

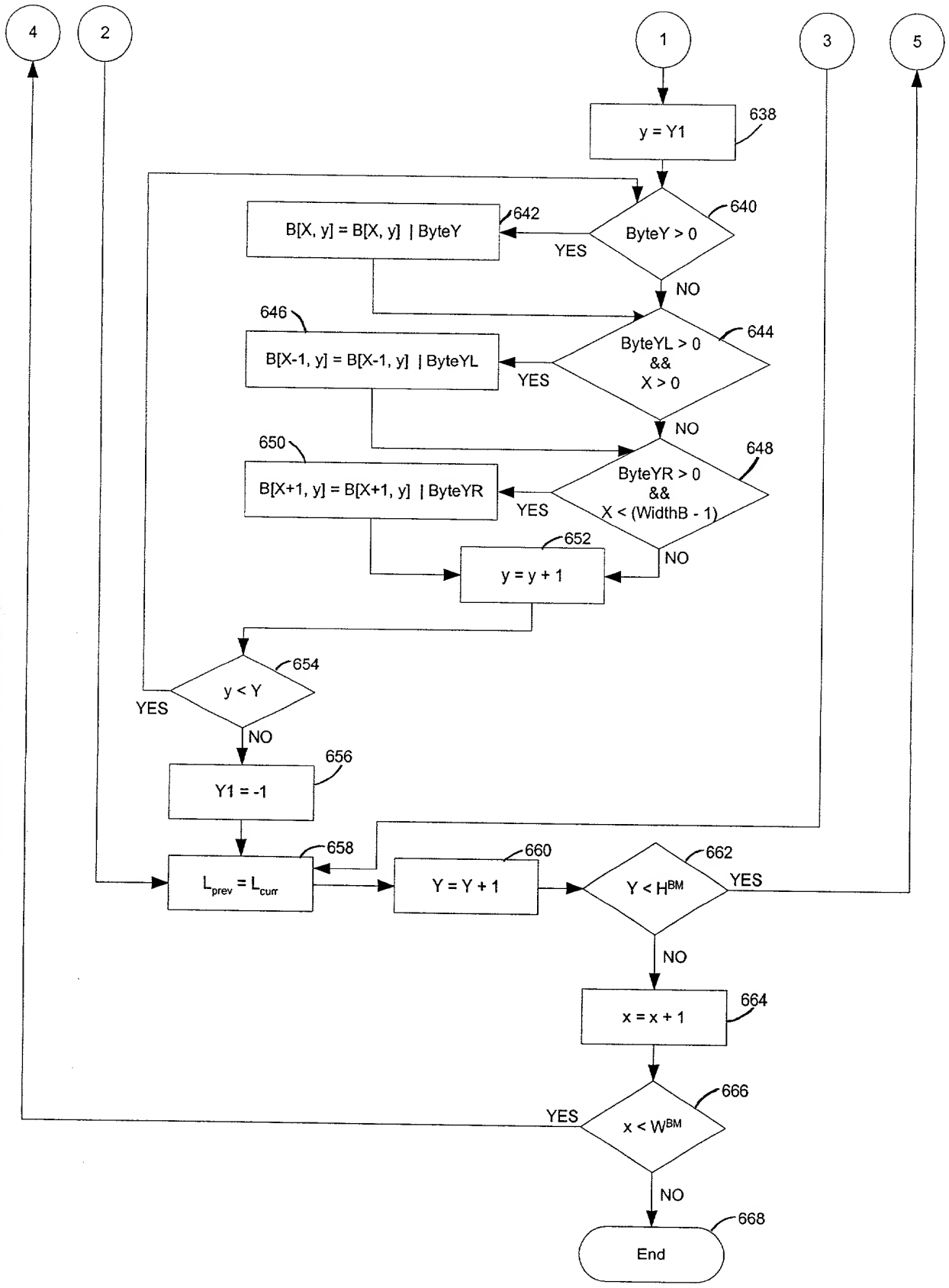
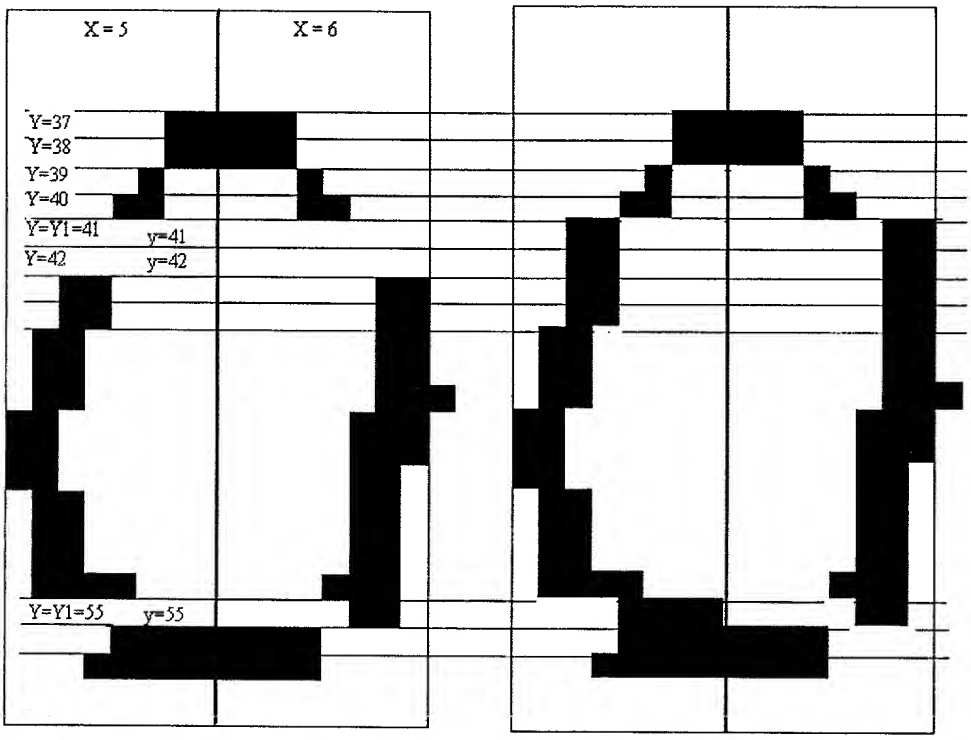

4
2
1
3
5
y = Y1
638
B[X, y] = B[X, y] | ByteY
642
ByteY > 0
640
YES
NO
646
B[X-1, y] = B[X-1, y] | ByteYL
ByteYL > 0 && X > 0
644
YES
NO
650
B[X+1, y] = B[X+1, y] | ByteYR
ByteYR > 0 && X < (WidthB - 1)
648
YES
NO
652
y = y + 1
y < Y
654
YES
NO
Y1 = -1
656
L_prev = L_curr
658
Y = Y + 1
660
Y < H^BM
662
YES
NO
x = x + 1
664
x < W^BM
666
YES
NO
End
668

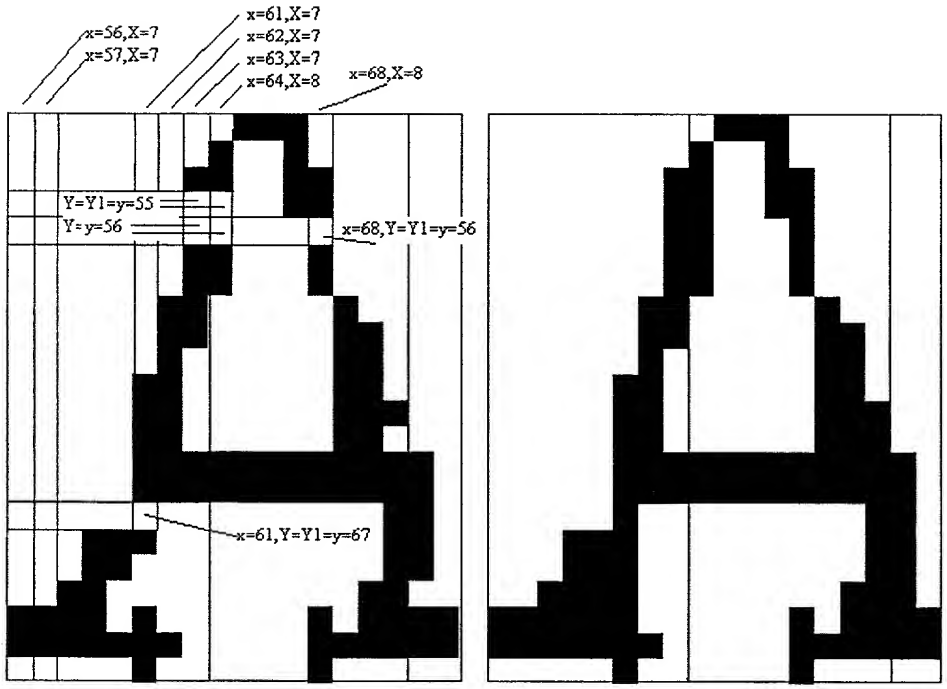
Figure 6b



Byte Length Enhancement Algorithm on the Original Image

The Image after Enhancement

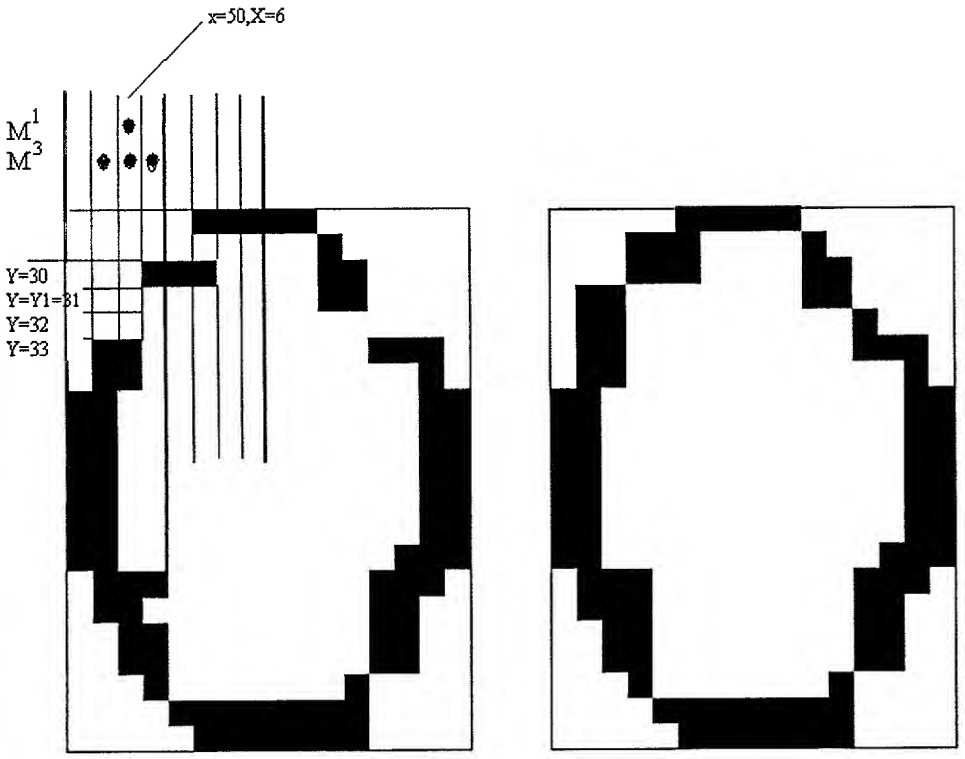
Figure 7



Bitwise Enhancement Algorithm on the Original Image

The Image after Enhancement

Figure 8



3-bit Enhancement Algorithm on the Original Image

The Image after Enhancement

Figure 9

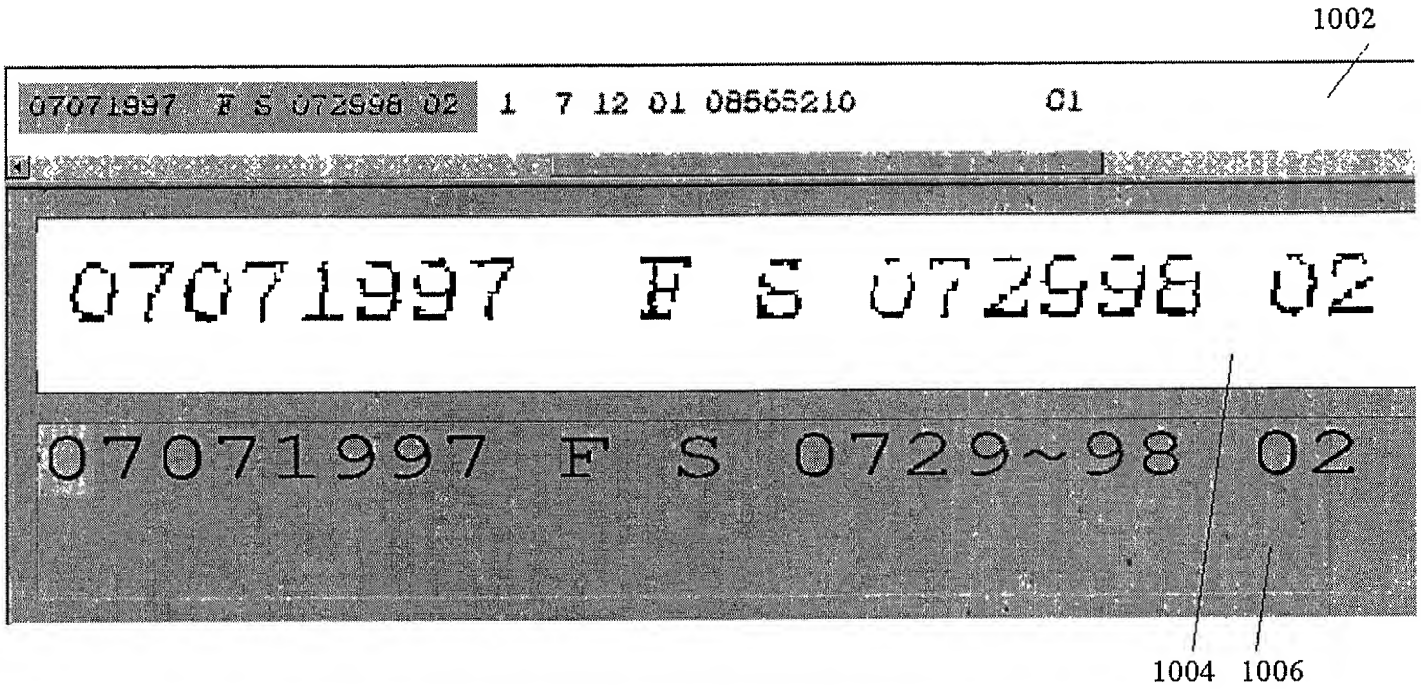

1002
07071997 F S 072998 02 1 7 12 01 08565210 01
07071997 F S 072998 02
07071997 F S 0729~98 02
1004
1006

Figure 10

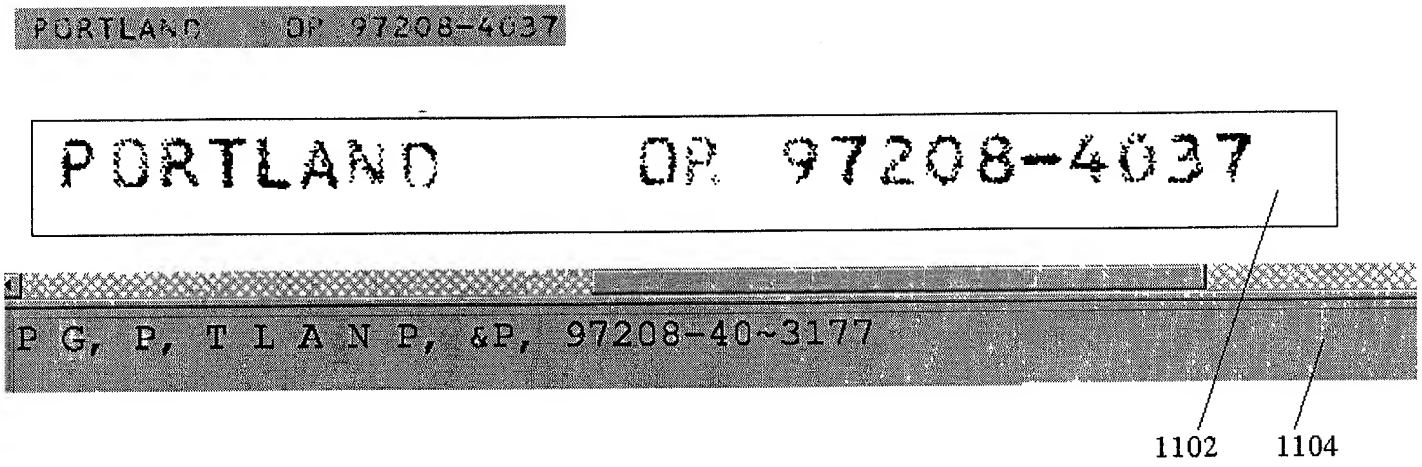

PORTLAND OP 97208-4037
PORTLAND OP 97208-4037
P G, P, T L A N P, &P, 97208-40~3177
1102
1104
PORTLAND OP 97208-4037
PORTLAND OP 97208-4037
PORTLANO OP 97208-4037
1106
1108

Figure 11